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ABSTRACT

The abstracts of papers presented at the 1971 NSTA Southeast Regional Conference, "Science Education - Southern Style," are grouped into these general subject areas: school science programs, K-12 (seven abstracts); preservice and inservice teacher education in science (14 abstracts); and science education and environmental education (seven abstracts). (PR)

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Association for the Education of Teachers in Science

ABSTRACTS OF PAPERS PRESENTED AT A SYMPOSIUM ON SCIENCE EDUCATION IN THE SOUTHEAST*

South Windsor Room, Hotel Robert Meyer
Jacksonville, Florida

9:00 a.m. - 4:00 p.m.
December 2, 1971

*NSTA Southeast Regional Conference, "Science Education - Southern Style". December 1-4, 1971.

SE 012 710

PREFACE

Included in this document are abstracts of papers to be published in the Spring (1972) issue of the Journal of Research and Development in Education, under the concept-theme "Science Education in the Southeast," and presented on December 2, 1971, at a symposium at the NSTA Southeast Regional Meeting in Jacksonville, Florida.

In March of 1971 an official call for papers was made by an Advisory Board for the Journal of Research and Development in Education under the auspices of the Southeast Section of AETS.

All persons who had papers accepted were invited to participate in the symposium. The document was typed and compiled by Mr. Hubbard Morris and Miss Vivianne Dedric of Georgia State University.

December, 1971

John R. Hassard
President-Elect, SE Section
AETS and Asst. Professor of
Science Education, Georgia
State University

PART ONE: School Science Programs, K-12, 9:00 a.m.-10:30 a.m.

Needed: A Student-Structured Science Course for the Elementary Teacher . . . . . Barnes and Penick

Science Objectives of Secondary School Teachers . . . . . Dough and Franceschi

Science, Mathematics, and Perceptual Skills at the Elementary School Level: An Interdisciplinary Approach to Learning Based on Manipulative Materials . . . . . Good

A Model for Student-Structured Laboratory Courses in Introductory College Physics . . . . . Good and Schwarz

Title III of ESEA and Science Education: The North Carolina Story . . . . . Goode

Child-Structured Learning in Science, An Approach to Relevant Science Education for Children . . Matthews and Westmeyer

Basic Ecology for Elementary Education Majors . . . . . Wish

NEEDED: A STUDENT-STRUCTURED SCIENCE COURSE FOR THE ELEMENTARY TEACHER

Lehman W. Barnes and John E. Penick

Florida State University

Abstract. This paper describes several failings of a teacher-structured science course as preparation for a student-structured science methods course. The proposed solution involves preceding the science methods course for elementary teachers with a series of student-structured science courses -- student-structured in that each student is free to manipulate materials and ideas, make predictions, explain outcomes, and structure knowledge in a manner which makes sense to him. The authors believe that this student-structuring will give the prospective teacher a deeper insight into the nature of science and science teaching as well as facilitating his transition from student to teacher.

SCIENCE OBJECTIVES OF SECONDARY SCHOOL TEACHERS OF PHYSICAL SCIENCE AND PHYSICS

Robert L. Dough and Elida O. Franceschi

East Carolina State University

A study was made of science objectives of 45 secondary school teachers of physical science and physics in eastern North Carolina. Specific goals were (1) to determine the objectives in science teaching which the teachers consider most important, (2) to indicate differences in objectives between the physical science teachers and the physics teachers, and (3) to compare the objectives of the teachers with those of a panel of professors. The information was obtained in two parts, a subjective listing of objectives which they considered most important and an objective ranking of 57 possible objectives. The science objectives test was especially developed for this study. Both tests were given in the fall, 1970, while the teachers were attending a NSF in-service institute in physics.

This group of teachers hold science objectives which are in agreement with those of a panel of professors and with published guidelines. No major differences were found between the physical science teachers and the physics teachers. Their main concern is to have students learn of the procedures of scientific investigation, physical phenomena in the world about them, and the importance of science.

SCIENCE, MATHEMATICS, AND PERCEPTUAL SKILLS AT THE ELEMENTARY SCHOOL LEVEL: AN INTERDISCIPLINARY APPROACH TO LEARNING BASED ON MANIPULATIVE MATERIALS

Ronald G. Good

Florida State University

The "typical" elementary school curriculum in this country is oriented heavily toward verbal learning so that children have few opportunities to work with concrete objects. Research conducted by Jean Piaget and others strongly emphasize the importance of personal interaction with objects for children of elementary school age in facilitating the growth of logical thinking. Science, mathematics, and what can be called "perceptual skills" contain many common elements in providing a learning environment which encourages the development of logical thinking.

Perceptual skills refer to abilities closely related to the process of searching for patterns. Sharpening one's perceptions to the patterns in nature and in mathematics is something that involves more than logico-mathematical thinking.

The structure of a program for elementary school children that is intended to facilitate the development of independent, logical thinking would have these characteristics: (1) manipulative materials are a part of each activity; (2) a variety of activities will be possible for children who are interacting with any set of materials; (3) activities should require little or no teacher structure.

A corresponding change in teacher preparation programs toward more "specialism" would provide a greater competence for teachers in facilitating learning in a manipulative materials-based curriculum.

A MODEL FOR STUDENT-STRUCTURED LABORATORY COURSES IN INTRODUCTORY COLLEGE PHYSICS

Ronald G. Good and Guenter Schwarz

Florida State University

Abstract. Curriculum projects in elementary school science during the past decade have emphasized doing science rather than reading or talking about it. The Department of Science Education at Florida State University offers a course for prospective elementary school teachers that emphasizes science as a process of investigating portions of one's enviornment. In an attempt to communicate science as a process of personal interaction with things rather than words, an introductory physics course was developed in cooperation with the Department of Physics at Florida State University.

The experimental course was implemented during the 1970-71 academic year. Students spent approximately four hours per week in laboratory investigations and one to two hours discussing the relationships of science and technology to society. Experiments for the course were chosen for criteria including the following: (1) minimum directions needed as to how the experiment can be pursued; (2) open-endedness, i.e., different approaches and various kinds of data would be possible using the equipment; (3) little or no prerequisite knowledge of specifics about mathematics or physics needed; and (4) experiments would be fun to do. The role of the instructor was one of encouraging independent behavior during investigations and removing external pressures that might inhibit such behavior.

Close observation during the quarter and individual final exams, given orally, indicated a generally positive attitude toward the course, although some students suggested more structure for the beginning experiences. Most of the students became obviously more confident at using equipment and designing ways of finding answers to their questions. A paper and pencil test on beliefs and attitudes toward science and science education was also

administered at the beginning and end of the course, but no statistically significant results were found.

If a student-structured approach to elementary school science is to become a reality, the prospective elementary school teacher must experience undergraduate science courses that arelogically consistent with the process oriented curricula that have been developed.

TITLE III OF ESEA AND SCIENCE EDUCATION: THE NORTH CAROLINA STORY

John M. Goode

American Management Association, Hamilton, N. Y.

Abstract. Title III of the Elementary and Secondary Education Act was designed to provide innovations for the schools of America. To enable the limited funds to be used for the innovations that have the best opportunity of improving education, a complex method of competitive funding was developed. In North Carolina a sizable portion of funds made available under Title III have been used to improve science education. Specific innovations can be classified into the categories of Field Trip Specialists, Planetariums, Environmental Education, and In-service Education. The programs described have all been continued after Title III funds have been exhausted. Other science-oriented projects are under way but have not stood the test of time of those discussed.

Field trip specialists were developed in five school systems. Their responsibilities generally include administrative details, parental permission, safety, transportation, field instruction, pre- and post-visit consultation with the teacher, and providing appropriate materials and supplies for the field trip.

Planetariums have been developed in three school systems. One of the facilities is located in a secondary school, the other two are in special facilities. The programs have been viewed by a wide variety of pupils and lay citizens. An unexpected bonus in the programs has been the strong public support for the program which has resulted in improved public relations for the school systems.

Environmental education programs were operational before the major efforts to develop a national environmental education program were begun.

The programs developed under Title III approached environmental education as an outcome from other programs and not as an end in itself. Most programs emphasize the nature trail approach to ecology with the exception of one program developing an integrated social studies, geography, economics and ecology secondary level course.

Extensive effort has been expended in Title III to provide in-service education that emphasizes an approach to education as contrasted with providing additional subject matter background. Science education has been treated only tangentially but the results show that science is taught in a more laboratory, investigative method than before the in-service experience.

CHILD-STRUCTURED LEARNING IN SCIENCE,
AN APPROACH TO RELEVANT SCIENCE EDUCATION FOR CHILDREN

Charles Matthews and Paul Westmeyer

Florida State University

Abstract. The Child-Structured Learning in Science Project at the Florida State University has been established for the development of relevant materials in science education for children. The psychological background for these materials in Brunerian-Piagetian, and the materials are presented to students in such a way as to allow for maximum student initiative. Materials currently developed include for Level One a supervisor's workshop, a teacher's workshop, an in-service program, a teacher's guide, a set of assessment devices, a kit of materials for use by children, and a series of video tapes for use by children.

BASIC ECOLOGY FOR ELEMENTARY EDUCATION MAJORS

Pete A. Wish

Campbell College, Buies Creek, N. C.

Basic Ecology for Elementary Education Majors is a one semester biology course and a basic requirement for students attempting a bachelor's degree with elementary education as a major.

In the area of elementary school teaching, an ever increasing emphasis is being placed on the following concepts: one, learning science through discovery and stressing science processes as well as science fact; two, student-centered investigations into the world of science; there, development of environmental education curricula (in some instances a K-12 program); four, de-emphasizing grades as a major instrument of motivation; five, a more field-centered or out-of-doors approach to the biological sciences.

In order to better prepare our future elementary school teachers to meet the above challenges, Basic Ecology for Elementary Education Majors was developed. This unique departure from the more traditional approaches to teaching biology focuses on the following concepts: one, approaching our environmental crisis through the understanding of four ecological principles (diversity, interrelationship, adaptation, and biology; three, course diversity through contrasting field studies; fourd, course unity through the use of scientific processes; five, use of scientific method of writing as an instrument for evaluation; six, student-centered investigations.

The course, designed to meet the needs of our future elementary school teachers, can also serve as a basic biology course for all non-science majors in college. The conceptual scheme can also serve as a guideline for science courses at elementary and high school levels.

SCIENCE FOR PREPRIMARY CHILDREN

W. R. Zeitler

University of Georgia

Recent emphasis upon educationof three, four and five year olds has increased the demand for preprimary educational programs. In response to this need a sequential, articulated science program was developed. Developmental characteristics of the preprimary age served as a basis for the program. Lessons were developed in two levels. One level provided perceptual experiences for the learner. The second level stressed the development of observational skills by the learner. The major teaching technique involved extensive interaction between the learner and equipment. The role of the teacher was that of a resource teacher or director of investigation. An extensive evaluation program was developed, consisting of the pretest - post test technique as well as behavioral evaluations at the completion of each lesson.

The overall goal of the science program was to initiate the development of investigative skills in the preprimary child.

PART TWO: Teacher Education in Science, 10:30-12:00

Pre-Service

Toward Competency Based Instruction . . . . . Capie

The Education of Teachers in Science . . . . . Hassard and Lucy

Quest: A Departure From Tradition at the Pre-Service Level . . . . . Schlitt

The Georgia Science Teacher Project . . . . . Schrum

A Model of Contemporary Philosophies Used in an Earth Science Teacher Education Program . . . . . Sonnier

Toward a More Realistic Science Methods Course . . . . . Welker

In-Service

Testing the Effectiveness of a Science Teacher In-Service Program Provided by Industry . . . . Awkerman and Landrum

Earth Science In-Service Television for Teachers . . . . . Beyer

ISCS - Individualized Teacher Preparation Modules . . . . . .Dawson

An Inservice Institute of Topical Conferences and Local Meetings for Secondary School Teachers of Physics . . . . . Dough

A Model for Elementary School Science In-Service Teacher Education . . . . . Greene

A Study of Junior High School Science Teachers Enrolled in an In-Service Institute in Earth Science . . . . . Hein

Identification of Classroom Practices of In-Service Science Teachers . . . . . Myers

Inservice Drug Education and Teacher Attitudes . . . . . Smith

TOWARD COMPETENCY BASED INSTRUCTION

William Capie

University of Georgia

Abstract. The Elementary Science Methods program at The University of Georgia is being converted to a competency based, self-paced modular format. Students are able to choose among a variety of activities and instructional modes. The course is taught in conjunction with a field experience so that immediate application ofnew approaches is possible. The developmental model has allowed for continuous revision and improvement. Problems encountered during course conversion are described along with possible solutions.

THE EDUCATION OF TEACHERS IN SCIENCE

John R. Hassard and Edward C. Lucy
Georgia State University

Abstract. The purpose of this paper is to describe the development and initial implementation of a program to prepare undergraduate majors in science teaching. Forces from the realms of society, the scientific enterprise, and recent science curriculum projects as well as alternative views of teaching have resulted in the need to develop new ways to prepare teachers for the future. After an initial experience that serves to provide a substantive study of education and an opportunity to explore teaching as a possible career, the student enters a three-phase sequential science education program that is experience based and taught by a team of educators from science, psychology and curriculum. The program is competency based and includes the following curriculum modules: the nature of science, the nature of the learner and learning science, and nature of instruction. Experiences are directed both in public schools and university settings. Each segment emphasizes competencies to be realized by the prospective teacher. The initial stage of implementation has been completed.

QUEST: A DEPARTURE FROM TRADITION AT THE PRE-SERVICE LEVEL

Dorothy Schlitt

Florida State University

In the past 15 years, science education has experienced curriculum changes at levels K-12. Despite the fact that elementary, junior high and senior high science have changed considerably, it is probably safe to assume that methods courses for pre-service science teachers have remained relatively static. One need only refer to the ROSES Report or consider the number of science teachers who are in need of in-service work before they have completed the first year of teaching to substantiate such an assumption.

Quality Undergraduate Education of Science Teachers (QUEST), a recent innovation at Florida State University, is designed to combat the problem of outdated teaching methods and materials at the pre-service level. Designed around a philosophy of early and continuous classroom experiences in grades K-12, as well as an analytical approach to studying student and teacher behaviors, the program is designed to change along with its pre-service teachers. While initial plans included a detailed curriculum of proposed courses, experience during the past year has provided evidence which makes such an approach untenable.

Based on the available feedback from students and instructors, the QUEST program may indeed be labeled a departure from tradition in an attempt to prepare a "new breed" of science teachers.

THE GEORGIA SCIENCE TEACHER PROJECT

John W. Shrum

University of Georgia

The Georgia Science Teacher Project was established as an effort of the University System in 1968 with financial support from the National Science Foundation. Six institutions are cooperating in a consortium effort to improve undergraduate programs for science teachers in Georgia.

The major thrusts of the Project are to recruit larger numbers of talented undergraduates in science teacher programs and to improve the preparation of prospective science teachers. Evaluation of the results of such efforts requires a minimum of six years to determine the impact of the Project on improved teacher preparation. Recruitment and program models are expected to result from experimentation and evaluation within each of the six participation institutions.

Three years of Project operation has resulted in changed programs for science teachers, new courses within programs, and cooperation of science and education faculties within and between institutions.

A MODEL OF CONTEMPORARY PHILOSOPHIES USED IN AN EARTH SCIENCE TEACHER EDUCATION PROGRAM

Isadore L. Sonnier

University of Southern Mississippi

National Science Foundation programs funded at the University of Southern Mississippi in earth science teacher education have been instrumental in the development of a model which envelops, accepts and fosters all of the contemporary philosophies of education. It is around this model that an ongoing curriculum development is occurring. The content and methods used take into consideration different philosophies of the individual teachers and make possible the satisfaction of these differences.

In so doing, different philosophies of teaching and learning have become divergent channels in the education of different earth science teachers. It is upon these divergent channels, i.e., philosophies and their basic psychological foundations, that the curriculum content and methods have been developed. The model described is not intended to be an end product, but an ongoing assessment of contemporary philosophies in education to which educators are held accountable in meeting the individual needs of all teachers. An outstanding implication is that these are the philosophies which meet the individual needs of secondary school students.

The needs of secondary school students are great and varied. It is upon this premise that a model of contemporary philosophies in education was developed. It is the contemporary needs of secondary school students that educators set out to meet. The content and methods used by educators in meeting these needs vary according to their philosophies. These philosophies have been categorized and the mutually exclusive points of

view are shown to be natural, basic, and understandable. In reality, they bring a more complete education to learners. Confusion in the educational institutions and difficulties for the learner are but two of the products of the lack of this "all inclusive" point of view.

TOWARD A MORE REALISTIC SCIENCE METHODS COURSE

James D. Welker

University of Alabama

A common complaint of career teachers regarding the required methods class is that it is too frequently presented as a course in the theories of teaching, with applications made to "ideal" teaching situations rather than to "real" situations as they actually exist in the classroom. Once in the field the new teacher finds himself ill-prepared for the realities of teaching. In short, methods classes have not done the job for which they were intended.

In an effort to provide a methods class for science teachers that is both informative and practical, the author has developed the approach which places the student in the role of a new teacher approaching his first teaching job. On the first day of class the students enrolled in "methods" are presented with a hypothetical school and community -- complete with detailed descriptions of key administrative personnel, fellow teachers, students and townspeople -- the world in which they will function as teacher for the next few months. Hand-out materials, kodachrome slides, tapes, and video-tapes are utilized periodically to provide additional information regarding the hypothetical situation. School facilities, supplies, and equipment pertinent to the classes to be taught are outlined and described, as are community attitudes regarding the local school, all of which have a direct bearing on what is taught and how this will be accomplished.

A firm believer that success in teaching is to be a great extent dependent on organization, the author devotes the first two weeks of the semester to helping the students find solutions to numerous problems related to classroom management. Keeping in mind the needs of the hypothetical community and school, the students are then asked to consider the nature of

the course they have been hired to teach. Each student prepares a one-year outline of his course, develops resource units and daily lesson plans, keeping in mind behavioral objectives previously identified. Test designs, based on behavioral objectives, serve as the terminating activity for the course.

TESTING THE EFFECTIVENESS OF A SCIENCE TEACHER IN-SERVICE PROGRAM PROVIDED BY INDUSTRY

Gary L. Awkerman and William L. Landrum

Charleston County School District, Charleston, S. C. 29401

Abstract. Will secondary science teachers experience a measurable attitude change toward industry-school relations as a result of participating in a cooperatively developed in-service program between industry and a school system? The experimental group (N=21) and control group (N=20) were randomly selected from approximately one hundred science teachers. Only the experimental group participated in the twelve-week program structured to include behavioral objectives, industry-defined vocabulary, rationale statements, and resource listings. A ten-item questionnaire and four-concept semantic differential instrument was administered in a post-test only, control group design. The general substantive hypothesis that the control group would have a less positive attitude on industry- school relations was supported by the questionnaire analysis, but not by the semantic differential results.

EARTH SCIENCE IN-SERVICE TELEVISION FOR TEACHERS

Case Study of a First Effort

Frederick L. Beyer, Jr.

N. C. Department of Public Instruction

Abstract. Since the inception of earth science as a part of the curriculum in North Carolina seven years ago, the problem of trained teaching personnel has come to light. The N.C. Board of Education sought to alleviate this problem area by initiating teachers in earth science. The course was to be a cooperative effort among the State Educational Television Network and the Division of Science Education and Educational Media within the State Department of Public Instruction.

During the spring and summer of 1970, an extensive course guide was prepared by the curriculum specialist employed to develop the course, and invitations were extended to all of the local school systems in North Carolina to participate. In August, sixteen seminar leaders, who had been selected by local units, met in Raleigh for three days to become acquainted with the course and prepare to lead the one-hour activity sessions that followed each television lesson.

During September, some 250 teachers began watching telecasts which would cover topics including basic astronomy, meteorology, oceanography, physical and historical geology. Demonstrations and advice on teaching methods were part of the televised work as well as some treatment of environmental considerations, with particular emphasis on North Carolina. The teachers came from backgrounds of great diversity of experience. Typically, teachers assembled to watch the television lesson in groups averaging twenty members. The activities following the telecast ranged from discussion to investigations and field trips conducted by the teachers themselves. Emphasis was placed on activity-oriented investi-

gations which taught concepts. During the following weeks, the program developer visited each of the seminars to confer with teachers, help with problems, and provide enrichment programs. In addition, the seminar leaders met during November and April to critique problems, preview upcoming programs, and discuss possible follow-up activities for teachers.

Evaluations were accomplished by personal interview and questionnaire. The results indicate a great need for more in-service programs and that television can be a very positive force in helping teachers to update and acquire new knowledge and skills. However, many lessons were also learned that can be applied to improve the design of in-service television programs in the areas of program structure, distribution techniques, and the design of materials for presentation to a diverse group.

ISCS - INDIVIDUALIZED TEACHER PREPARATION MODULES

George Dawson

Florida State University

Abstract. This article describes efforts in the Intermediate Science Curriculum Study to produce individualized instructional materials for the training of ISCS teachers. Problems of pre- and in-service training of teachers for specific curriculum projects are investigated. Suggestions as to how the Individualized Teacher Preparation Modules can be used to resolve some of these problems are made. The rationale behind the development of the modules is briefly described. The format of the modules and suggestions for their use by teacher educators in pre- and in-service settings are discussed.

AN INSERVICE INSTITUTE OF TOPICAL CONFERENCES AND LOCAL MEETINGS FOR SECONDARY SCHOOL TEACHERS OF PHYSICS

Robert L. Dough

East Carolina University

Abstract. Most of the teachers of physical science and physics in easthern North Carolina have a limited academic background in physics. In order to help them present a more effective course, an institute of topical conferences and local meetings was held during the 1970-71 school year. There were five six-hour conferences with each one being devoted to a particular topic. The titles of the conferences were: The Laws of Motion, Transformations of Energy, Electric Currents, Electromagnetic Radiations, and Atomic and Nuclear Physics. Lectures, demonstrations, and laboratory experiments were presented to enrich the background of the teachers in subject matter and in pedagogical techniques. The local meetings were held between the conferences. Six secondary school teachers were designated as teacher-consultants and they instructed at the local meetings in their areas. The emphasis at these local meetings was on specific text material related to the forthcoming conference, simple inexpensive experiments, demonstratrations, and teaching procedures. Over fifty teachers participated in the local meetings. From a questionaire and many discussions with the participants and the teacher consultants, it appears that the teachers became aware of new ideas and source materials, they developed more confidence as a teacher of physics, and they were favorably impressed with the institute.

A MODEL FOR ELEMENTARY SCHOOL SCIENCE IN-SERVICE TEACHER EDUCATION

Edgar D. Greene, Jr.

Appalachian State University

Abstract. The instructional methods used in the Model Elementary School Science In-Service Program -- the instructor playing the role of a "model" science teacher using very indirect influence; small group teaching and discussion; and large group lecture and discussion -- were based on three assumptions: (1) a teacher must like science before he can effectively teach science; (2) a teacher must know a science program before he can teach it; and (3) a teacher must be taught in the same manner he is expected to teach.

The major focus of the Model Program is to enable elementary school teachers to develop more effective science teaching behavior. A system of evaluating teachers' performance occurs in both the in-service course, and with systematic observations, in the elementary school science classroom.

A STUDY OF JUNIOR HIGH SCHOOL SCIENCE TEACHERS ENROLLED IN AN IN-SERVICE INSTITUTE IN EARTH SCIENCE

Harold C. Hein

University of Southern Mississippi

An In-Service Institute in Earth Science for Secondary School Teachers sponsored by the National Science Foundation was conducted at the University of Mississippi during the 1970-71 academic year. At the beginning of this Institute data for the years of teaching experience, the extent of NSF Institute participation, and academic preparation in chemistry, biology, physics, and geology was obtained by means of a questionnaire administered to all participants. The teachers included in this study consisted of all of the participants who were currently teaching science at the Junior High School level.

Achievement of teachers on Test of Science Knowledge before enrolling in an In-Service Institute was analyzed and major deficiencies were found to exist. Linear correlation coefficients between achievement on TOSK and various factors in the academic background of the participants were determined. A significant relationship at the .05 level was found to exist between achievement on TOSK and hours of credit earned in physics and years of teaching experience. Linear correlation coefficients between achievement on TOSK and hours of credit earned in biology and weeks of attendance at NSF Institutes were not significant.

IDENTIFICATION OF CLASSROOM PRACTICES OF IN-SERVICE SCIENCE TEACHERS

Mary Jayne Myers

University of Southern Mississippi

Twenty teachers were selected as a sample from a total of 120 participating in an NSF In-Service Institute and a Cooperative College-School Science Program. A Student-Teacher Participation Checklist (STPC) was administered to the students of the sample teachers.

The 36-item Checklist, written in the student vernacular, reflected the classroom practices of their teachers. Data was obtained from 493 students located around five centers in Mississippi. The courses studied by the teachers were Earth Science Curriculum Project, Introductory Physical Science, and Intermediate Science Curriculum Study.

The STPC is based on four areas of agreement identified in the three programs: (1) the teacher's role is that of a resource person, (2) the materials are student-oriented, (3) use is made of textbooks, and (4) the materials are structured for individual and small group participation.

The practices identified were in five categories: (1) the teacher's role, (2) the students' participation, (3) the textbook and its use, (4) laboratory preparation, and (5) laboratory participation of the students.

The results of this study indicate that students perceived their teachers as performing toward the desired goals of the curriculum in the role of the teacher. The students also perceived that the textbooks were being utilized in the manner for which they were intended and that laboratory experiences were being implemented which involved participation and inquiry.

Seven specific practices were identified as a standard for the science classrooms used in the study. These practices favored the rationale and philosophy of theprograms under study.

INSERVICE DRUG EDUCATION AND TEACHER ATTITUDES

Sidney P. Smith

Georgia State University

Abstract. As one of the participating states in the Federally funded Drug Education Program, Georgia received 69 thousand dollars through the United States Department of Health, Education and Welfare, which is being used to train school personnel throughout the state. The purpose of this research was to evaluate teachers' attitudinal changes as a consequence of having participated in a 15 week drug education program sponsored by the Georgia State Department of Education. The sample for this investigation consisted of 57 (grades 1 - 12) teachersrepresenting six county and independent school systems that were involved in the Inservice Drug Education Program.

To study attitudinal changes, data was gathered by utilizing a modified form of the Semantic Differential developed by Osgood, Suci and Tannenbaum and the Attitude Toward Any School Subject instrument developed by Silance and Remmers. The Attitude Toward Any School Subject instrument is a 45 item, Thurston-type scale in which "Drug Education" was used as the referent. The Semantic Differential instrument was composed of five topics (Drugs in My Life, Learning About Drugs, Drug Addicts, Medical Treatment for Drug Abusers, and Legal Treatment for Drug Abusers) each having a scale of ten or more bipolar adjectives.

The topics "Drugs in My Life" and "Learning About Drugs" were viewed by this sample of teachers as being more relevant. Also the drug education classes were instrumental in improving these teachers' attitudes and beliefs concerning the broad concept "Drug Education".

PART THREE: Science Education and Environmental Education, 2:00-3:30

A Critique of a Community-Oriented Ecology Short Course . . . . . Bourne and Brown

Inservice Education on Man's Interaction with His Environment . . . . . .Colton

Field Biology for Elementary Education Majors . . . . . Hampton

Development of Conservation Education Materials in South Carolina . . . . . Jackson

Critical Factors in Planning Environmental Education for the Elementary School Child . . . . . Matthews

A Workshop for Re-Directing Efforts in Environmental Education . . . . . Rivers and Allen

A Request for a Rational Approach to Environmental Science . . . . . Schlitt and Barnes

A CRITIQUE OF A COMMUNITY-ORIENTED ECOLOGY SHORT COURSE

John R. Bourne and Jack S. Brown

Florence State University

Abstract. Faculty members of the Science Department, Florence State University, were asked to cooperate with staff members of the Environmental Biology Branch, Tennessee Valley Authority, in the coordination and presentation of a short course on the Florence State campus in basic ecology and environmental pollution. The program was initiated at the request of the officers of the local American Association of University Women who sponsored the program during the spring semester, 1971. The course content which was determined by course coordinators was presented to a group of approximately one hundred concerned citizens, students and local industrial leaders of the community. The methods used involved lecture presentations supplemented with visual aids. The course concluded with a panel discussion moderated by the state health officer. Other panel members included local industry leaders, local faculty members, and scientists from other institutions in the state.

INSERVICE EDUCATION ON MAN'S INTERACTION WITH HIS ENVIRONMENT

Theodore Colton

Georgia State University

In developing a curriculum to help sensitize teachers to man's interactions with his environment, it was decided by the developer to construct an atmosphere wherein the teachers would become totally involved. This was done by exposing the teachers to a wide range of urban and natural settings in which they could participate in various experiences. The course included activities involving industries, municipal and state agencies, and rural areas surrounding Atlanta. The course also included a micro teaching session in which the teachers applied some of the competencies gained during the course. Subjective evaluations by the participants indicated that the activities within the curriculum had been effective and goals as specified had been reached.

FIELD BIOLOGY FOR ELEMENTARY EDUCATION MAJORS

Carolyn H. Hampton

East Carolina University

Abstract. When the North Carolina State Department of Public Instruction authorized a subject matter certification for elementary school teachers in grades four through nine, the Department of Science Education added to its program courses for those teachers who wish to qualify for certification in science.

Field Biology was designed to provide an elective course for elementary majors who wished to certify in science and who wanted a course in the biological sciences in addition to the required introductory course.

The primary objectives of this course are:

1. To increase the students' knowledge in basic ecological principles and man's role in the balance of nature.

2. To provide students with the methods and techniques for the collection, identification, maintenance and utilization of living organisms in the elementary school science program.

3. To provide students with the opportunity to construct learning activities in environmental science for children.

It does not follow that a teacher trained in subject matter content will be successful in devising teaching activities or in leading his pupils in investigative projects. A large portion of time is spent in developing competency in inquiry. The class is presented a problem of environmental significance by the teacher; the class collectively decides what variables are to be studied and what investigative techniques are to be used.

DEVELOPMENT OF CONSERVATION EDUCATION MATERIALS IN SOUTH CAROLINA

John Y. Jackson

Abstract. South Carolina began to develop Conservation Education materials in 1965. Through out the development of the material, four points were uppermost:

1. The material should be capable of providing guidance for teachers.
2. To provide background knowledge for the teacher.
3. To develop a program that would unite efforts of natural resource agencies with the prblic schools.
4. To develop material that would fit into the existing curriculum.

Each guide has approximately 45 lessons and has the same three major concepts.

1. Living things are interdependent with one another and with their environment.
2. Organisms (or population of organisms) are the product of their heredity and environment.
3. Organisms and environments are in constant change.

The development of the material took three years to complete, at which time nearly 30,000 copies were distributed within South Carolina.

Workshops are now being conducted throughout the state to help teachers become thoroughly familiar with the guides.

CRITICAL FACTORS IN PLANNING ENVIRONMENTAL EDUCATION FOR THE ELEMENTARY SCHOOL CHILD

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Abstract. Various groups of scientists and educators have responded to the "environmental crisis" by a variety of efforts to develop activities for elementary school children. There are some indications that many of these groups are ignoring research findings related to the learning of elementary school children. There are indications that the environmental education "curriculum developers" are considering only the most obvious factors which contribute to success or failure of school programs.

This paper focuses attention on four critical factors associated with the development of environmental education activities. There factors are: (1) goals, (2) characteristics of learners, (3) learning conditions, and (4) program evaluation.

It is suggested that "K-6 environmental education groups" should represent expertise associated with each of the four factors.

A WORKSHOP FOR RE-DIRECTING EFFORTS IN ENVIRONMENTAL EDUCATION

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With the sudden increase of interest in teaching environmental science, a real danger appears possible. So much of the material written on the subject emphasizes teaching students the necessity of assuming greater responsibility in preserving natural resources. Although we, too, value the development of a sense of ecological responsibility in elementary school children, the danger seems to be in how this awareness is produced.

If we wish the child eventually to be able to evaluate environmental relationships and propose reasonable alternatives to present environmental destruction, the child must be allowed to do <u>science</u>. He must be allowed to examine the environment using a child's perspective. In addition, the situations must be simple enough for him to observe and manipulate. Once allowed to make objective appraisals of relatively simple relationships, these very appraisals will serve as a framework for making judgments when his cognitive development allows him to acquire the capability for analysing the complexity of environmental problems.

In order to help teachers effectively identify, delimit and organize systems and materials which are appropriate for elementary school children, a training workshop was held during June, 1971, at the Resource-Use Outdoor Education Center in Perry, Florida.

Our strategy in preparing the teachers for providing outdoor science experiences was to model the philosophy, rationale, and program which we expect them to use with their own students. This consisted of:

(1) Providing an initial outdoor problem, and allowing each person to design his own inquiry strategies and make up his own explanations. Later in the workshop, he made up his own problems and systems as well.

(2) Through discussions and interactions, allowing each teacher to develop a rationale for environmental science which is compatible with the nature of modern science and the intellectual, physical, and emotional characteristics of his grade-level children.

(3) Developing manipulative materials and environmental systems which met the requirements of his own rationale.

(4) Allowing each teacher to try his materials and systems on a group of children.

(5) Evaluating their appropriateness.

A REQUEST FOR A RATIONAL APPROACH TO ENVIRONMENTAL SCIENCE

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Abstract. Approximately ten years ago, traditional biology courses were under attack as new curriculum materials were introduced in the 10th grade classroom. Today, under pressure from legislators, parents and other well-intentioned citizens, schools across the country are introducing courses labeled environmental science which are replacing existing biology programs. The unfortunate aspect of this trend is not that biology courses are being revised but rather the fact that what is being introduced can hardly be labeled science. The new environmental science courses are characterized at best by confirmatory activities and reading about social problems. The question raised is not whether environmental education should be included in the curriculum but, rather, whether or not environmental education should be equated with the teaching of science.